

REMARKS

Claims 15, 18-23, 25, 37-50, 52-53 and 55 are the only claims under prosecution in this application.

Applicants have cancelled claim 51 because it depends from previously cancelled claim 4.

Applicants have amended claims 15, 20, and 41 to clarify the language and provide congruence with the specification with respect to the heating zone of the present invention. Support for these amendments can be found on pages 17-19 of the specification. No new matter has been added.

Applicants have amended claim 52 to depend from non-cancelled claim 18 instead of cancelled claim 17. Applicants request that these amendments be entered to put this application in better form for appeal or allowance.

First Rejection Under 35 U.S.C. 103(a)

Claims 15, 1-23, 25, and 37-50 have been rejected under 103(a) as being unpatentable over Metrailler et al. in view of Koveal et al. (US 6,199,768).

The Examiner argues that Metrailler et al. discloses a heating zone similar to the present invention, which is upstream from the atomization zone of Figure 2. Applicants disagree.

The apparatus of the present invention is designed so that heat transfers from the liquid oil to the steam in the heating zone. The superheated atomizing steam then impacts the oil with higher velocity and kinetic energy. This is the complete opposite from the purported heating zone of Metrailler et al. Metrailler et al. specifically teach away from heating the steam. See Column 2, lines 66-69. Metrailler et al. teach that the steam helps maintain the temperature of the oil. Thus, in Metrailler et al. the steam is preheated to 350°F prior to entering the supposed heating zone and in

the present invention the steam is heated in the heating zone. One having ordinary skill in the art reading Metrailler et al., without reading the instant specification, would not be led to create an apparatus comprising the instantly claimed heating zone with a "built-in" steam superheater. Additionally, Metrailler et al. disclose only a single continuous atomization passageway positioned concentrically about a central passageway. The passageway of Metrailler et al. wraps 360° around a central passageway. On the contrary, the instantly claimed invention, requires a plurality of passageways positioned concentrically around the perimeter of the central passageway. This is very different than the passageway of Metrailler et al. and one having ordinary skill in the art reading Metrailler et al., without reading the instant specification, would not be led to the instantly claimed type of passageways.

The deficiencies in Metrailler et al. are not overcome by combining it with any secondary references. The Examiner has done a thorough job analyzing the claims and comparing features of the instant with features the Examiner believes is taught in either Metrailler et al. or Koveal et al. While applicants believe that they can swear behind Koveal et al. they nevertheless take the position that the instant claims, as now amended, provide a patentable invention over both Metrailler et al. and Koveal et al. alone or in combination. There is no suggestion in any of these references to provide an apparatus containing the unique plurality of atomization passageways as instantly claimed. Therefore, applicants request that this rejection be withdrawn.

Second Rejection under 35 U.S.C. 103(a)

Claims 51-53 and 55 are rejected under 35 U.S.C. 103(a) as being unpatentable over Metrailler et al. in view of Koveal et al. as applied to the claims above, and King et al. (US 5,577,668). Applicants have cancelled claim 51.

The Examiner cites King et al. as teaching a sparger that distributes flow in a radial direction, axial direction or a combination of the two for the purpose of evenly distributing the fluid. The Examiner believes that it would have been obvious to one of ordinary skill in the art at

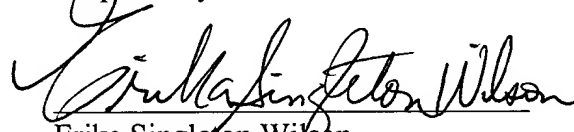
the time of applicants' invention to have provided a sparger that allows the fluid to pass into a central passageway in a radial flow, axial flow, or both in the modified apparatus of Metrailler et al. in order to evenly distribute a fluid as taught by King et al.

The deficiencies in Metrailler et al. are not overcome by combining it with any of the secondary references for the same reasons stated above. It is applicants' position that there would not be motivation for one looking to improve the injection of gas oils into the riser of a petroleum fluid catalytic cracking unit to look to King et al. Furthermore, claims 52, 53, and 55 depend from patentable claims.

Therefore, in view of the above, and in view of amendments made to claims 15, 20, 41, and 52 applicants request that the Examiner pass this application to allowance. The Examiner is requested to call applicants attorney should he have any questions regarding this response.

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Respectfully submitted,



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- 8 -

MARKED-UP VERSION OF AMENDED CLAIMS ACCOMPANYING RESPONSE TO
FINAL OFFICE ACTION FOR 09/824,332

15. (Twice Amended) An apparatus for atomizing a fluid comprising:

- (a) a central passageway for allowing a fluid to be atomized to pass therethrough;
- (b) an atomization zone positioned downstream from and in fluid communication with, said central passageway;
- (c) and a plurality of atomization fluid passageways, comprising steam, configured to fluidly communicate with the central passageway via atomization fluid passageway outlets, wherein the atomization fluid passageway outlets have a forward acute angle greater than 60° and are positioned concentrically about a perimeter of the central passageway; and
- (d) a heating zone configured to promote heat exchange between the central passageway and the plurality of atomization fluid passageways to superheat said steam, wherein the heating zone is positioned upstream from the atomization zone; and
- (e) a mixing zone comprising a first inlet for a fluid to be atomized and a second inlet positioned upstream of said central passageway from said atomizing fluid passageway outlets, which second inlet is a sparger which is comprised of a cylindrical conduit containing a plurality of sparger fluid passageways to allow the passage of sparger fluid into said mixing zone, and which mixing zone is in fluid communication with said central passageway.

20. (Twice Amended) An apparatus for atomizing a fluid comprising:

- (a) a central passageway for allowing a fluid to be atomized to pass therethrough;
- (b) an atomization zone positioned downstream from and in fluid communication with, said central passageway;

- (c) a plurality of atomization fluid passageways, comprising steam, configured to fluidly communicate with the central passageway via atomization fluid passageway outlets, wherein the atomization fluid passageway outlets have a forward acute angle greater than 60° and are positioned concentrically about a perimeter of the central passageway; and
- (d) a heating zone configured to promote heat exchange between the central passageway and the plurality of atomization fluid passageways to superheat said steam, wherein the heating zone is positioned upstream from the atomization zone; and
- (e) a steam splitter positioned within the central passageway upstream from the atomization fluid passageway outlets, and
- (f) a mixing zone comprising a first inlet for a fluid to be atomized and a second inlet positioned upstream of said central passageway from said atomizing fluid passageway outlets, which second inlet is a sparger which is comprised of a cylindrical conduit containing a plurality of sparger fluid passageways to allow the passage of sparger fluid into said mixing zone, and which mixing zone is fluid communication with said central passageway; and

wherein the central passageway has a cross-section comprising two-dimensions, wherein as at least one of the two dimensions converges in a downstream direction along at least a portion of the length of the central passageway, wherein the atomization zone has a cross-section comprising two dimensions and wherein at least one of the dimensions diverges in a downstream direction along at least a portion of the length of the atomization zone.

41. (Twice Amended) A nozzle for atomizing a petroleum product comprising:

- (a) a central passageway for allowing a fluid to be atomized to pass therethrough;
- (b) an outlet comprising an atomization zone and a spray distributor positioned downstream from and in fluid communication with, said central passageway, which spray distributor is configured to promote a predetermined spray pattern;

- (c) a plurality of atomization fluid passageways fluidly communicating with the central passageway via atomization fluid passageway outlets, wherein the atomization fluid passageway outlets have a forward acute angle greater than 60° and are positioned concentrically about a perimeter of the central passageway; and
- (d) a heating zone configured to promote heat exchange [between] from the petroleum feed and the atomization fluid before the petroleum feed and the atomization fluid mix.

52. (Once Amended) The apparatus according to claim 1[7]8 wherein said sparger comprises at least one fluid passageway configured to allow fluid passage into said central passageway, wherein said sparger fluid passageways are configured to promote radial flow, axial flow, or combinations thereof, said flow relative to the overall direction of fluid flow in said central passageway.